
Lists

Wish list

```
def main():
    wish = input("Enter your with: ")
    # do something with your wish
    print("Your wish is " + wish)
```

```
def main():
    wish = input("Enter your with: ")
    # do something with your wish
    print("Your wish is " + wish)
```

Two wishes?

```
def main():
    wish1 = input("Enter your with: ")
    wish2 = input("Enter your with: ")
    # do something with your wishes
    print("Your wish is " + wish1)
    print("Your wish is " + wish2)
```

```
def main():
    wish1 = input("Enter your with: ")
    wish2 = input("Enter your with: ")
    # do something with your wishes
    print("Your wish is " + wish1)
    print("Your wish is " + wish2)
```

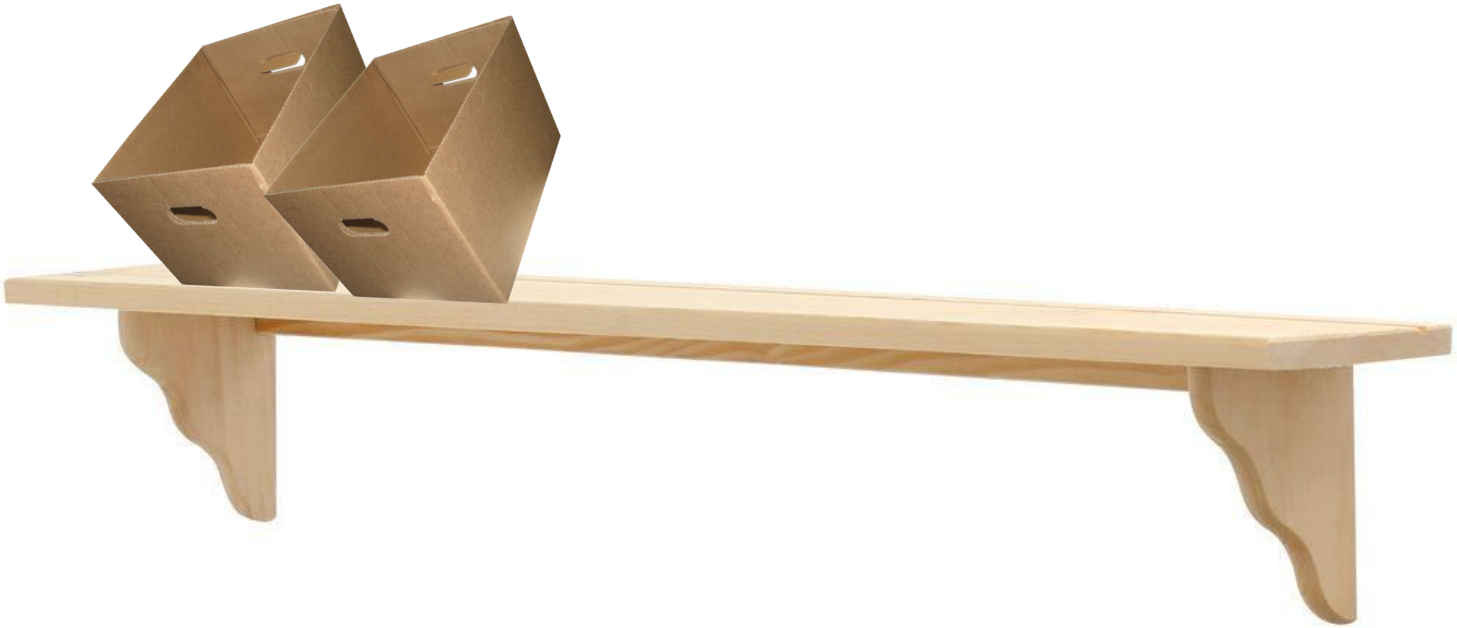
Ten wishes?

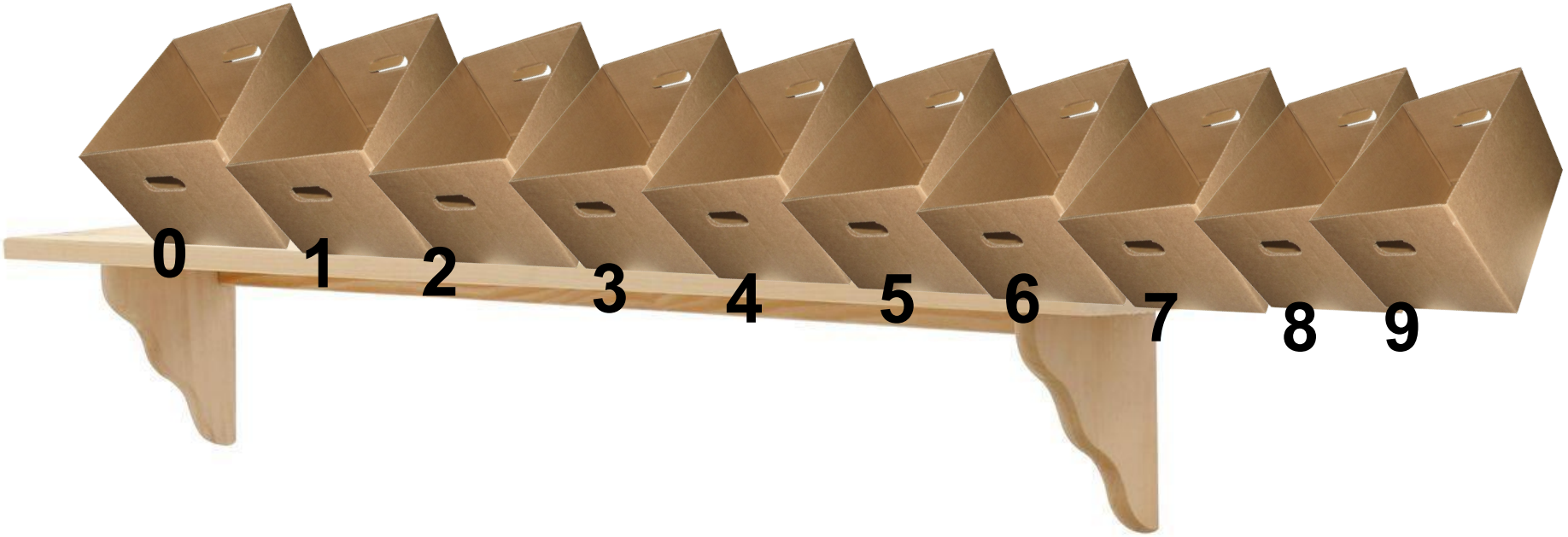
```python
def main():
    wish1 = input("Enter your with: ")
    wish2 = input("Enter your with: ")
    wish3 = input("Enter your with: ")
    wish4 = input("Enter your with: ")
    wish5 = input("Enter your with: ")
    wish6 = input("Enter your with: ")
    wish7 = input("Enter your with: ")
    wish8 = input("Enter your with: ")
    wish9 = input("Enter your with: ")
    wish10 = input("Enter your with: ")
    # do something with your wishes
    print("Your wish is " + wish1)
    print("Your wish is " + wish2)
    print("Your wish is " + wish3)
    print("Your wish is " + wish4)
    print("Your wish is " + wish5)
    print("Your wish is " + wish6)
    print("Your wish is " + wish7)
    print("Your wish is " + wish8)
    print("Your wish is " + wish9)
    print("Your wish is " + wish10)
```

```
def main():
    wish1 = input("Enter your with: ")
    wish2 = input("Enter your with: ")
    wish3 = input("Enter your with: ")
    wish4 = input("Enter your with: ")
    wish5 = input("Enter your with: ")
    wish6 = input("Enter your with: ")
    wish7 = input("Enter your with: ")
    wish8 = input("Enter your with: ")
    wish9 = input("Enter your with: ")
    wish10 = input("Enter your with: ")
    # do something with your wishes
    print("Your wish is " + wish1)
    print("Your wish is " + wish2)
    print("Your wish is " + wish3)
    print("Your wish is " + wish4)
    print("Your wish is " + wish5)
    print("Your wish is " + wish6)
    print("Your wish is " + wish7)
    print("Your wish is " + wish8)
    print("Your wish is " + wish9)
    print("Your wish is " + wish10)
```

- A **list** is way to keep track of an *ordered collection* of items
  - Items in the list are called "elements"
  - Ordered: can refer to elements by their position
  - Collection: list can contain multiple items
- The list dynamically adjusts its size as elements are added or removed
- Lists have a lot of built-in functionality to make using them more straightforward

wish

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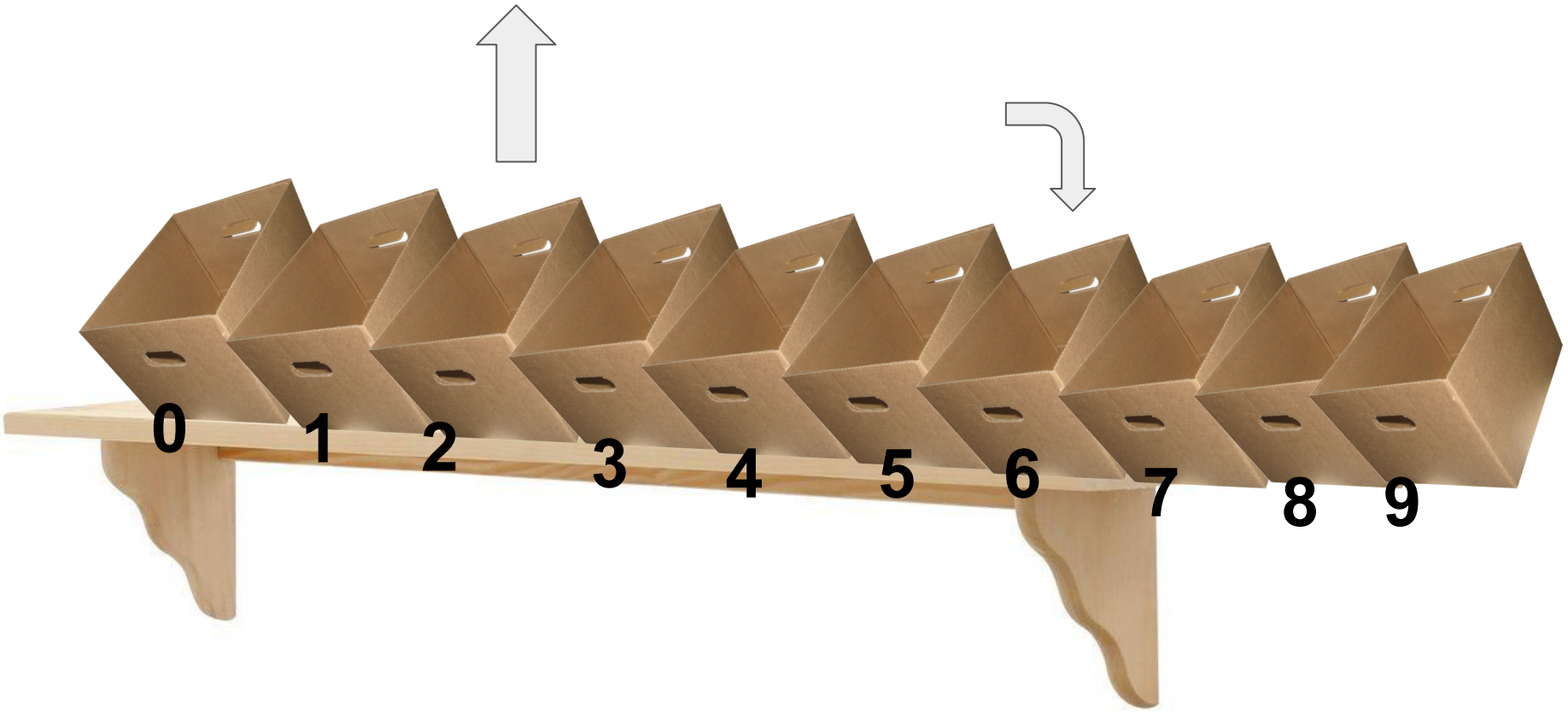
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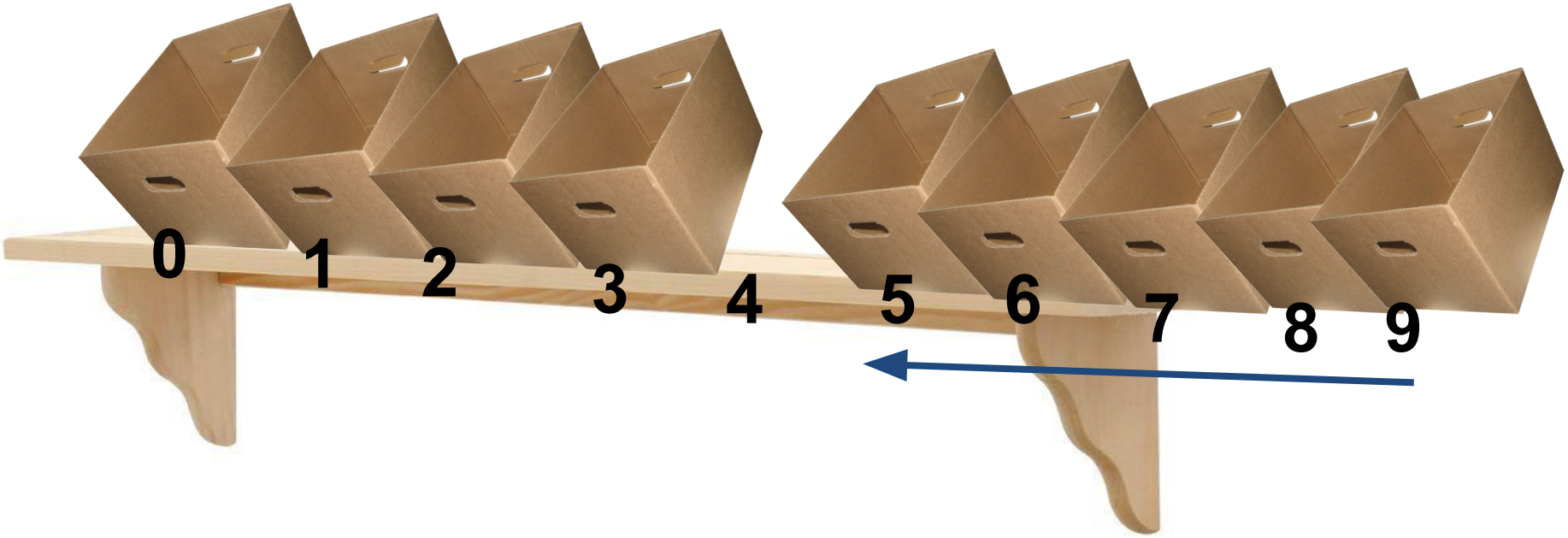
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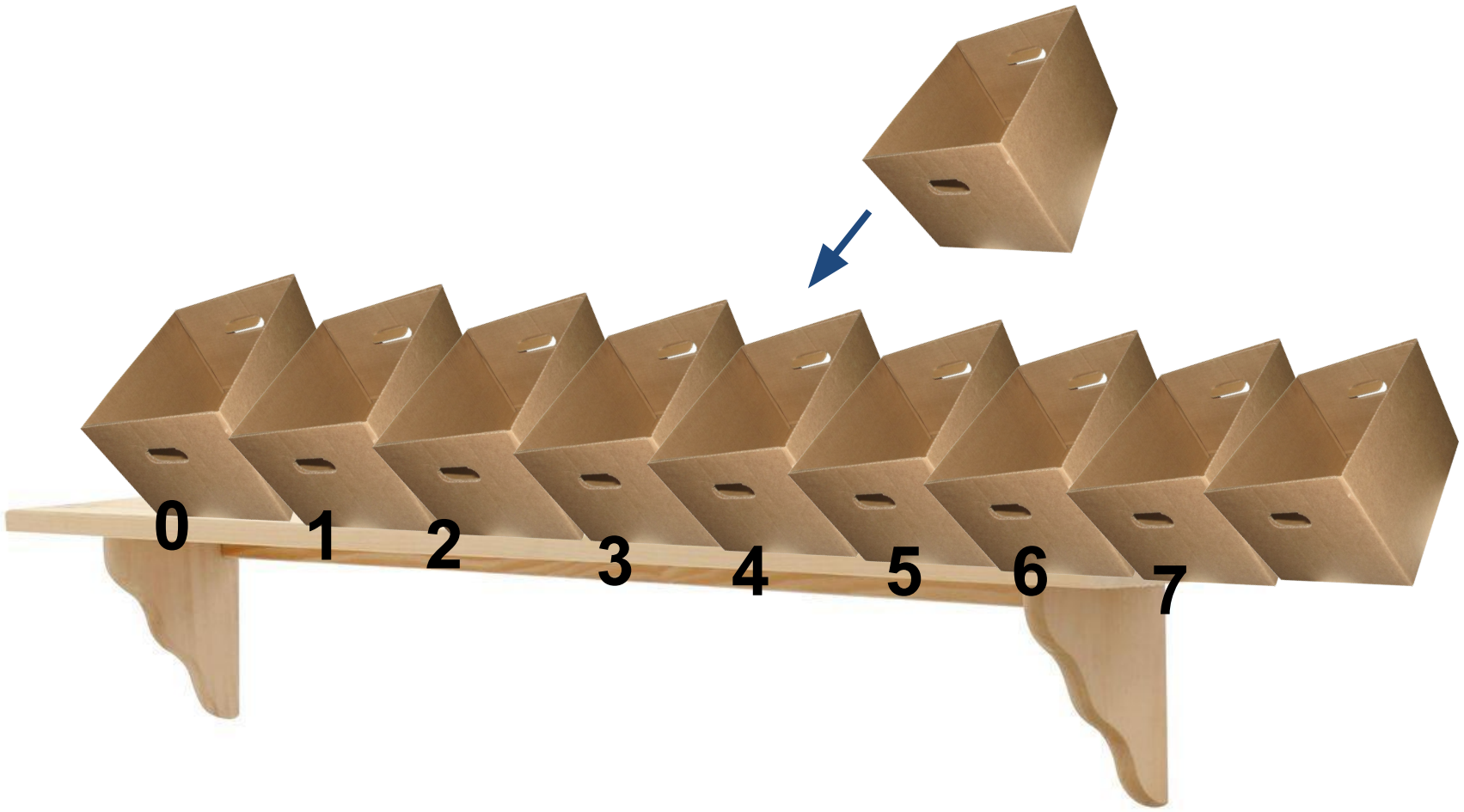
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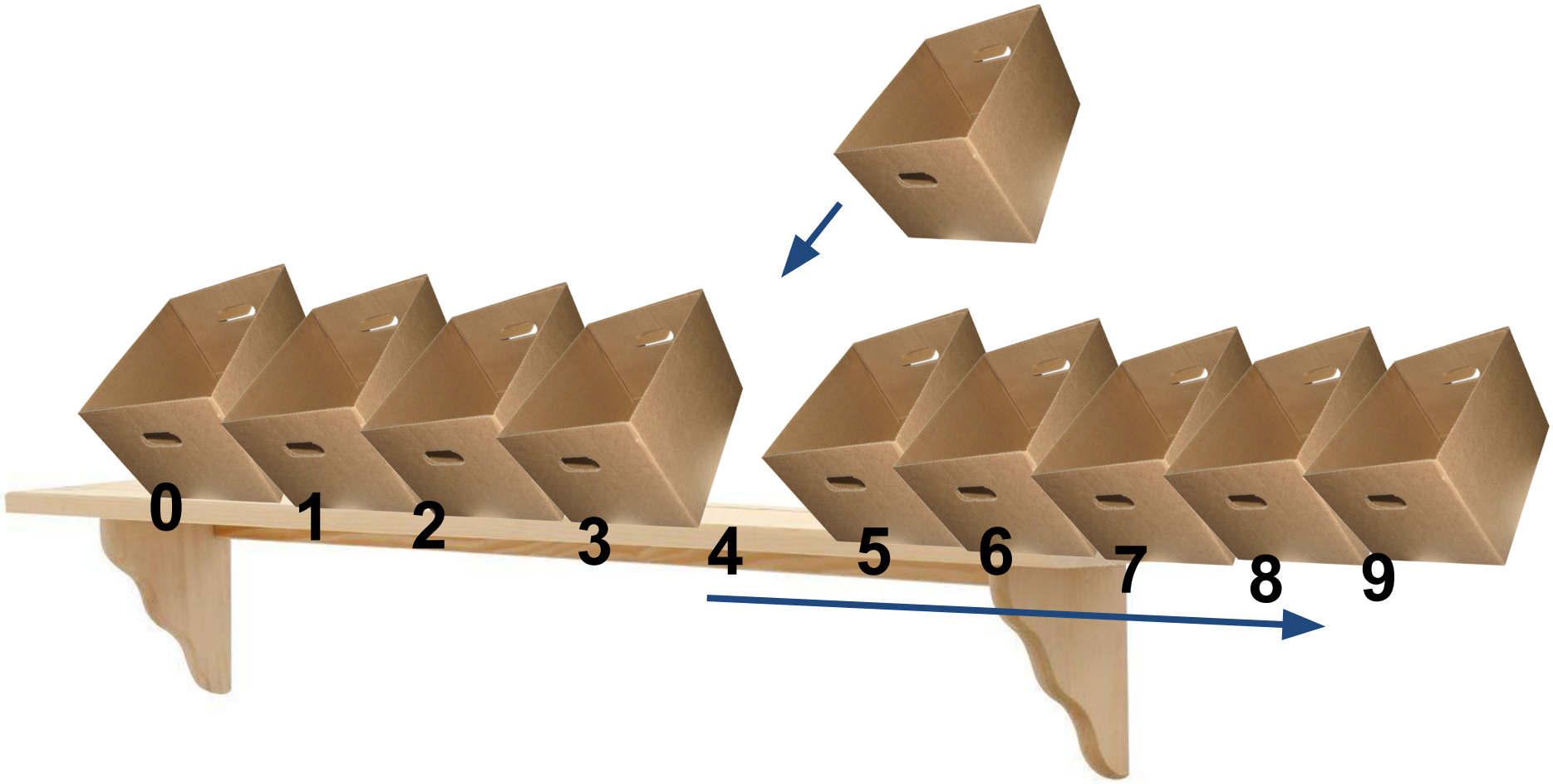
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```
wishes = int(input("How long is your wish list? "))
wish_list = []
for i in range(wishes):
    wish = input("Enter your wish: ")
    wish_list.append(wish)
# do something with your wishes
for i in range(len(wish_list)):
    wish_remembered = wish_list[i]
    print("Your wish is " + wish_remembered)
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    wish_remembered = wish_list[i]
    print("Your wish is " + wish_remembered)
```

```python
wishes = int(input("How long is your wish list? "))  wishes: 2
wish_list = []
for i in range(wishes):
    wish = input("Enter your wish: ")
    wish_list.append(wish)
# do something with your wishes
for i in range(len(wish_list)):
    wish_remembered = wish_list[i]
    print("Your wish is " + wish_remembered)
```

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wishes = int(input("How long is your wish list? "))  wishes: 2
wish_list = []  wish_list: []
for i in range(wishes):
    wish = input("Enter your wish: ")
    wish_list.append(wish)
# do something with your wishes
for i in range(len(wish_list)):
    wish_remembered = wish_list[i]
    print("Your wish is " + wish_remembered)
```

```
wishes = int(input("How long is your wish list? "))  wishes: 2
wish_list = []  wish_list: []
for i in range(wishes):  i: 0
    wish = input("Enter your wish: ")
    wish_list.append(wish)
# do something with your wishes
for i in range(len(wish_list)):
    wish_remembered = wish_list[i]
    print("Your wish is " + wish_remembered)
```

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wishes = int(input("How long is your wish list? "))  wishes: 2
wish_list = []  wish_list: []
for i in range(wishes):  i: 0
    wish = input("Enter your wish: ")  wish: 'Thor\'s Hammer'
    wish_list.append(wish)
# do something with your wishes
for i in range(len(wish_list)):
    wish_remembered = wish_list[i]
    print("Your wish is " + wish_remembered)
```

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wishes = int(input("How long is your wish list? "))  wishes: 2
wish_list = []  wish_list: ["Thor's Hammer"]
for i in range(wishes):  i: 0
    wish = input("Enter your wish: ")  wish: 'Thor\'s Hammer'
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# do something with your wishes
for i in range(len(wish_list)):
    wish_remembered = wish_list[i]
    print("Your wish is " + wish_remembered)
```

```
wishes = int(input("How long is your wish list? "))  wishes: 2
wish_list = []  wish_list: ["Thor's Hammer"]
for i in range(wishes):  i: 1
    wish = input("Enter your wish: ")  wish: 'Thor\'s Hammer'
    wish_list.append(wish)
# do something with your wishes
for i in range(len(wish_list)):
    wish_remembered = wish_list[i]
    print("Your wish is " + wish_remembered)
```

```
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wish_list = []  wish_list: ["Thor's Hammer"]
for i in range(wishes):  i: 1
    wish = input("Enter your wish: ")  wish: 'Captain America\'s Shi
    wish_list.append(wish)
# do something with your wishes
for i in range(len(wish_list)):
    wish_remembered = wish_list[i]
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wish_list = []  wish_list: ["Thor's Hammer", "Captain America's Shie
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    print("Your wish is " + wish_remembered)
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    wish_remembered = wish_list[i]
    print("Your wish is " + wish_remembered)
```

More fun with lists

```
wish_list = ["Thor's Hammer", "Captain America's Shield"]
```

```
wish_list = ["Thor's Hammer", "Captain America's Shield"]
```


```
wish_list[1] = "Infinity Stone"
```


```
wish_list.insert(1, "Captain America's Shield")
```


```
wish_remembered = wish_list.pop(1)
```

Captain America's Shield


```
wish_list.remove("Infinity Stone")
```

Remove the first matching element

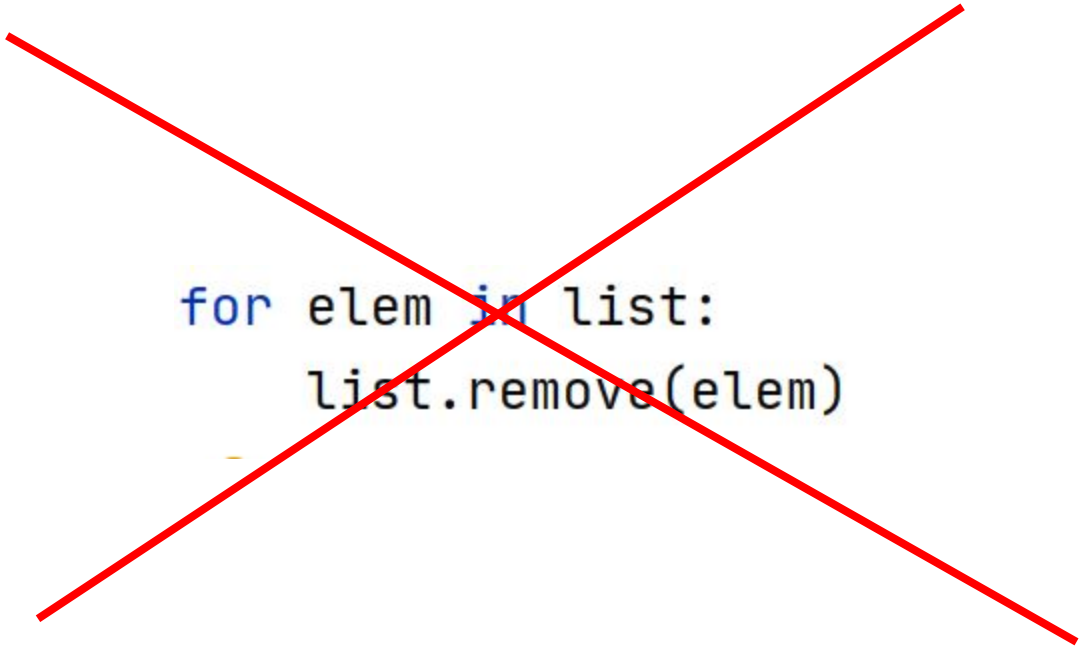

```
wish_remembered = wish_list.pop()
```

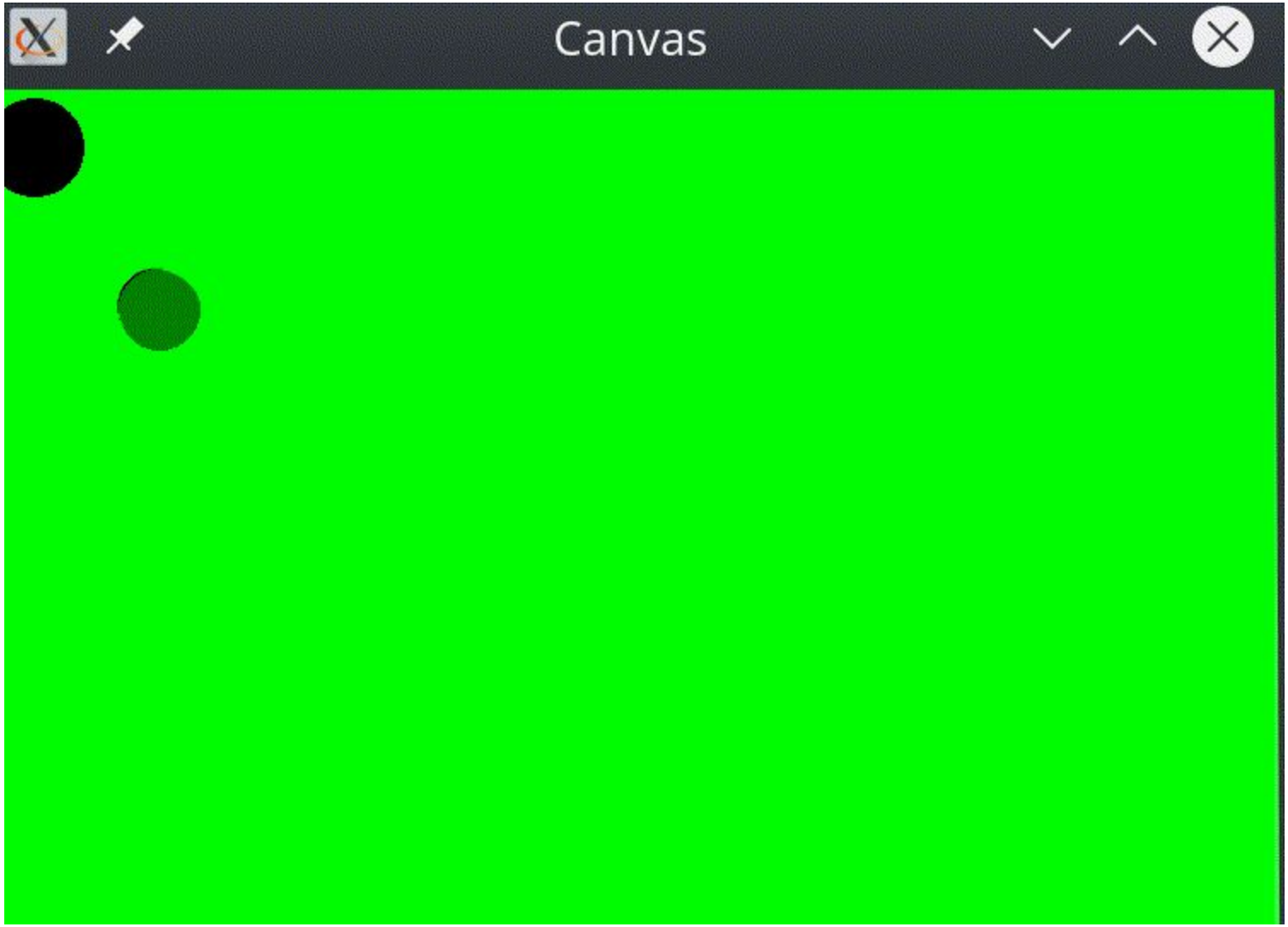
Thor’s Hammer

```python
list = [1, 3, 5, 7]

for i in range(len(list)):
    print(list[i])

for elem in list:
    print(elem)
```


for elem in list:
list.remove(elem)


Canvas

```
from graphics import Canvas
from time import sleep
import random

COLORS = ['black', 'white', 'blue', 'green', 'yellow', 'grey']


def main():
    canvas = Canvas()
    canvas.set_canvas_background_color('lime')
    balls = []
    add_ball(canvas, balls)
    while True:
        if random.randint(0, 100) > 98:
            add_ball(canvas, balls)
        animation_step(canvas, balls)
        stop_balls_out(canvas, balls)
        sleep(1/90)
        canvas.update()
```

```
from graphics import Canvas
from time import sleep
import random

COLORS = ['black', 'white', 'blue', 'green', 'yellow', 'grey']


def main():
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        stop_balls_out(canvas, balls)
        sleep(1/90)
        canvas.update()
```

```
from graphics import Canvas
from time import sleep
import random

COLORS = ['black', 'white', 'blue', 'green', 'yellow', 'grey']


def add_ball(canvas, balls):
    diameter = random.randint(20, 70)
    ball = canvas.create_oval(0, 0,  diameter, diameter)
    color = COLORS[random.randint(0, len(COLORS)-1)]
    canvas.set_color(ball, color)
    balls.append(ball)
```

```
from graphics import Canvas
from time import sleep
import random

COLORS = ['black', 'white', 'blue', 'green', 'yellow', 'grey']


def add_ball(canvas, balls):
    diameter = random.randint(20, 70)
    ball = canvas.create_oval(0, 0,  diameter, diameter)
    color = COLORS[random.randint(0, len(COLORS)-1)]
    canvas.set_color(ball, color)
    balls.append(ball)
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        animation_step(canvas, balls)
        stop_balls_out(canvas, balls)
        sleep(1/90)
        canvas.update()
```

```
def animation_step(canvas, balls):
    for ball in balls:
        canvas.move(ball, random.randint(-1, 3), random.randint(-1, 4))
```

```
from graphics import Canvas
from time import sleep
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COLORS = ['black', 'white', 'blue', 'green', 'yellow', 'grey']


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            add_ball(canvas, balls)
        animation_step(canvas, balls)
        stop_balls_out(canvas, balls)
        sleep(1/90)
        canvas.update()
```
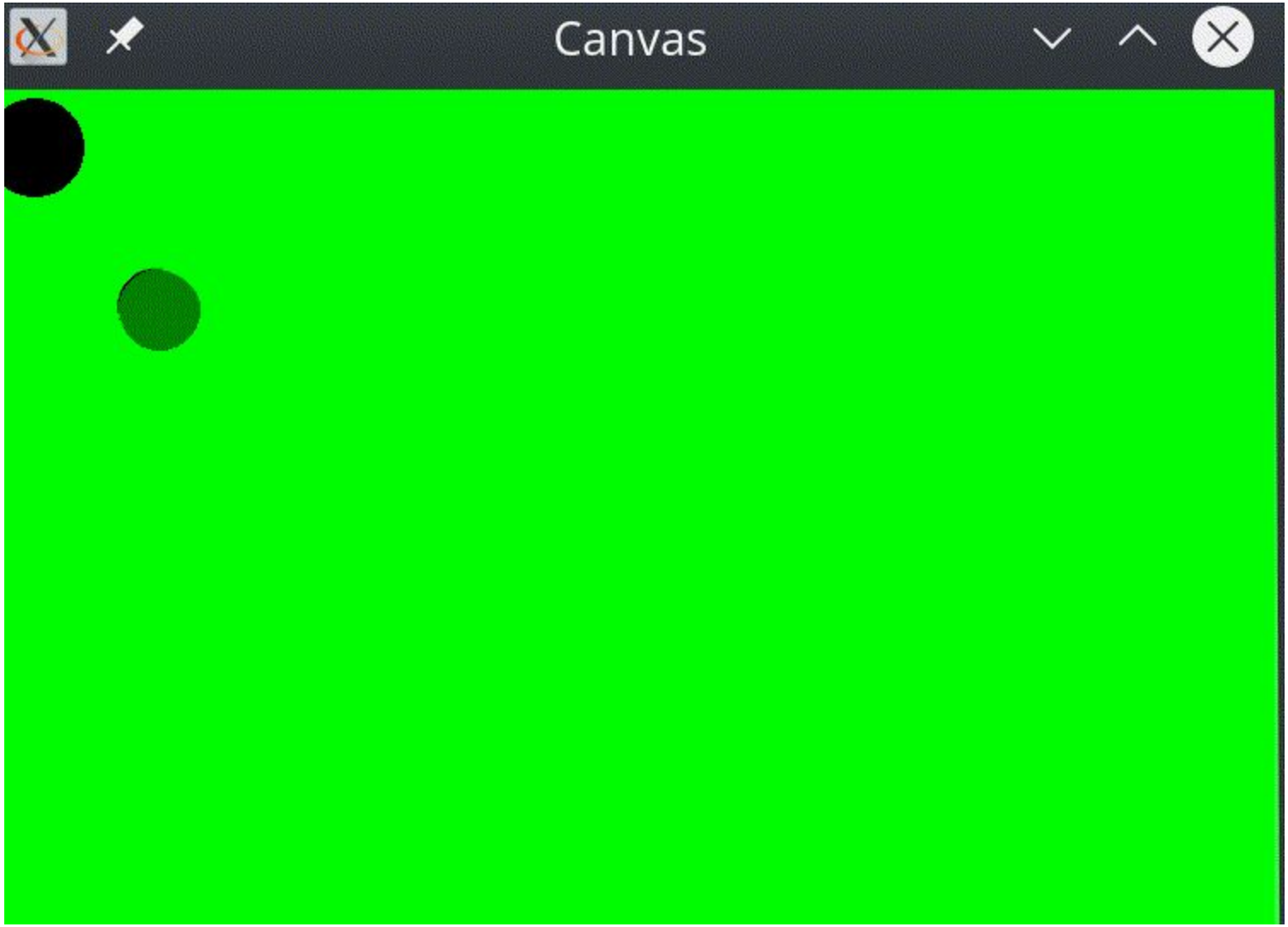

```
def stop_balls_out(canvas, balls):
    balls_to_remove = []
    for ball in balls:
        if ball_is_out(canvas, ball):
            balls_to_remove.append(ball)
    for ball in balls_to_remove:
        balls.remove(ball)


def ball_is_out(canvas, ball):
    return canvas.get_left_x(ball) < 0 or canvas.get_left_x(ball) > canvas.get_canvas_width() \
           or canvas.get_top_y(ball) < 0 or canvas.get_top_y(ball) > canvas.get_canvas_height()
```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